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PROG8220 – Project Description

Receipt Keeper

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# Problem

Many existing apps for using receipts to track expenses have problems such as:

* A time consuming process for gathering data because the user has to enter data or human intervention is required to complete a scan of a receipt at all.
* After data is gathered, many apps have a limited amount of things you can do with that data, i.e. generate reports
* A long process to set up and start using the app due to the requirement to set up an online account specifically for the app and before you can start using it
* Costs that must be paid just to start using the app at all or after a very limited number of uses

Apps on the market now typically have one of these drawbacks and do not offer a solution that effectively solves all of these problems. Many apps take longer to gather data, don’t offer good reporting functions, are difficult to set up, are expensive or have several of these problems.

Our goal is to combine solutions to these problems with some exciting new features in a new app.

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# Our Solution

*Receipt Keeper* will combine these features to make expense tracking quick and easy. To do this, it will use Optical Character Recognition (O.C.R.) to make gathering the data from paper receipts faster and easier and minimize how much work the user needs to do. Furthermore, it will generate reports that allow the user to see where their money is going including for small incidentals with costs that add up over time. It will also minimize the time it takes to get the app up and running by allowing people to sign up using an existing Facebook or Google account.

The main fields that will be scanned from a receipt include the total. Additional fields to scan include the name of the store, a breakdown of items and a date. These will need to be tested with care, as different stores print dates on receipts in different formats (mm-dd-yyyy or yy/dd/mm, etc.) and store names can be harder to get with O.C.R.

Our solution will allow users to start a group which others can become a part of, and this will allow people to see reports for the group.

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# Platforms

*Receipt Keeper* will be built to work on Android devices and will also include a web app. The mobile application will make it easier for people to manage categories, tags and reports while having the convenience of scanning receipts wherever they are. The web application will provide the list of receipts and show graphs to visualize user’s spendings for a designated period. Additionally, as a good to have feature, receipts uploaded by users within a group can be seen by a group manager.

# Comparison of existing products

To get a sense for what existing apps do, a sample of apps for scanning receipts or general document photographing and scanning with Android devices were considered. Of the ones that got some positive online reviews and had a high number of downloads, ones that were easy to install and produced test results in a reasonable time were considered in detail. Apps that proved excessively difficult and very time consuming just to get up and running on a device were not considered.

These apps were tested on a Motorola Moto E (2nd Generation) running Android version 6.0.

Table 1(shown below) summarizes the comparison of these existing apps. More detailed information is available in the Appendix (Tables 2 - 7).

The star ratings provided were based on the team testing and discussing results with regard to specific features that our new app will address.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ease of installation and setup** | **Automatic Optical Character Recognition** | **Reports** | **Data Structure** | **Additional Features** | **Speed** | **Allows Groups** | **Avg.** |
| **Receipts** | ★★★★ | N/A | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | N/A | ★4 |
| **SmartReceipts** | ★★★★★ | N/A | ★★★★ | ★★★★★ | ★★★★ | ★★★★★ | N/A | ★3.28 |
| **Expensify** | ★★½ | ★★★★ | ★★ | ★★★★★ | ★★★ | ★★½ | ★★ | ★3 |
| **GoogleDrive** | ★★★★★ | ★★★★★ | N/A | ★★½ | N/A | ★★½ | ★★½ | ★2.5 |
| **CamScanner** | ★★ | ★★ | N/A | ★★½ | ★★ | ★★½ | ★★ | ★1.85 |
| **ShoeBoxed** | ★★ | ★★½ | N/A | ★★ | ★★ | ★ | N/A | ★1.35 |

Table 1. Comparison of Existing Apps

The highest rated apps here are Receipts and SmartReceipts, but the major feature both of them lack is Automatic Optical Character Recognition. Our goal is to create an app that includes that in addition to the other features compared here.

N/A means the feature is not there or could not be found during testing, i.e. if it is available it is not clear from searching the app’s official web site for help or browsing in the app on a device.

# Target Market

By providing a solution that allows receipts to be quickly photographed, scanned and entered and provide a good variety of reports, *Receipt Keeper* will be especially useful for anyone with a significant need to track expenses and look for ways to save money while minimizing the time they have to spend to track expenses. This includes parents trying to pay down mortgage debt while raising a young family, or people recovering from a layoff and trying to rebuild their savings nest egg. Other people do so temporarily as a learning exercise (i.e., some teachers of personal finance courses will tell students to very carefully track their spending for a period of time so they can learn from the data they gather).

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# Distinct Features

The intent of this project is to include a combination of features that the existing apps that were studied do not offer in just one app. Some of them have some of the individual features but our combination of features will be different. This will consist of:

1) Photographing receipts

2) Putting the photographed receipts through an O.C.R. engine and letting the user correct any errors. This will allow the data to be captured quickly, without a requirement for the service provider to supply human intervention which is very time consuming and increases the cost of an app.

3) Viewing the gathered data on the device and on a web app

4) Organizing data with categories and letting the user view reports based on these categories and time. For example, tracking how much money one spent in a certain category over a specific number of months. Reports will be part of the web app.

5) Creating a group.

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# Possible Additional Features

1. Generate more than basic reports, offering different styles of graphs and charts.

This will satisfy different users’ preferences for how they like to view their data.

1. Allow people to record transactions without receipts and automate recording repetitive ones like having the same coffee from the same shop every day.

This will let users keep track of small, regularly occurring expenses that can add up to a lot of money over weeks and years.

1. Allow users to track data not just for individuals but for groups.

Families or businesses will be able to work together closely to track expenses and see how best to save money together.

1. Track not just totals but specific items on a receipt and report on money spent on those items.

Users will be able to see how much they spend on these items over time, this is especially useful when buying lots of groceries that are on one long receipt.

1. Allow users to add tags as well as categories.

Users will have the option to add multiple tags to receipts and then generate reports that incorporate those tags to get a more detailed level of reporting.

1. Include reports that show averages for certain demographic groups.

For users who like to know how they compare to other people, this gives people ideas about whether they can save more money if other people are able to do so. This feature could only be implemented if privacy laws are appropriately respected and users give their consent for their data being used in this way.

1. Distinguish between business and personal accounts.

This will allow the users to better keep track of different categories of expenses within different kinds of accounts.

1. Combine several images taken of a long receipt into one receipt record.

Shopping at stores with many departments and purchasing a lot of items will have one receipt record in the system based on the single transaction.

1. Let users import and export data.

This is another option for making backups and sharing data with other apps, which is a convenience if switching from another app.

1. Send reports by e-mail.

This will give users more flexibility to easily share reports with others, make copies of reports and save them in different formats.

# Technical

Receipt Keeper is composed of three components; mobile application, web cient application, and web server.

The mobile application will be built in Android Studio version 2, and will use an open source O.C.R. based on the Tesseract project. One currently under consideration is rmthis/android-ocr which is a mobile version of theTesseract project and can be found on GitHub: <https://github.com/rmtheis/android-ocr>. The type of mobile application will be native type which will use predefined REST API set provided by web server. It will be tested on a mobile devices running Android version 6.0(Marshmallow).

The web client application will be developed using the Angular framework, which is useful for development on Heroku and will be built with Loopback and AngularJS. These tools will be used to create APIs that the mobile app can use to connect to the web app.

The web server application will be implemented on the Loopback framework, and some node modules. Loopback is an open source framework supported by IBM and will save a lot of time for implementing and managing the API set. More detailed about comparision between BAAS(Backend As A Service) at Appendix Table 8.

During the development of the mobile application, when developing interoperation functions between the mobile app and the application and server, keeping the server up and running is needed. For this reason, Heroku PAAS(Platform As A Service) with Loopback build pack will be used. By uploading to a Heroku server with git, build and deployment is done automatically. Additonally, it will be pulled source from Github regularily for smoke test.

Additionally, for saving data, Mongo DB will be used. To run the application, DAAS (database as a service) is needed. Among the service providers considered, Mongolab will be used because they provide 500MB of storage space for free which will be enough space during the development phase.

Finally, for project management, a Github private repository will be used. This will be used not only for source code management, but also managing documents, the project schedule and sharing knowledge within the team - all of this will be fulfilled with Github.

# References

1. **Expensify** – Expense Reports (On Google Play Store) [*https://play.google.com/store/apps/details?id=org.me.mobiexpensifyg&hl=en*](https://play.google.com/store/apps/details?id=org.me.mobiexpensifyg&hl=en)
2. **CamScanner** – Phone PDF Creator (On Google Play Store) [*https://play.google.com/store/apps/details?id=com.intsig.camscanner&hl=en*](https://play.google.com/store/apps/details?id=com.intsig.camscanner&hl=en)
3. **ShoeBoxed** – (On Google Play Store) [*https://play.google.com/store/apps/details?id=com.shoeboxed.android.phonegapapp&hl=en*](https://play.google.com/store/apps/details?id=com.shoeboxed.android.phonegapapp&hl=en)
4. **Smart Receipts –** (On Google Play Store) [*https://play.google.com/store/apps/details?id=wb.receipts&hl=en*](https://play.google.com/store/apps/details?id=wb.receipts&hl=en)
5. **Google Drive Blog -** [*https://drive.googleblog.com/2013/05/a-smoother-drive-app-for-android.html*](https://drive.googleblog.com/2013/05/a-smoother-drive-app-for-android.html)
6. **TechRepublic, “**Five apps for managing your receipts”, Brian Posey, February 3, 2015, Accessed May 11, 2016 -[*http://www.techrepublic.com/blog/five-apps/five-apps-for-managing-your-receipts/*](http://www.techrepublic.com/blog/five-apps/five-apps-for-managing-your-receipts/)
7. **Tidal Pool Software**- Accessed May 11, 2016[*http://www.tidalpool.ca/receipts/manual.html*](http://www.tidalpool.ca/receipts/manual.html)
8. **Expensify *–*** Accessed May 12, 2016 *-* [*https://www.expensify.com/*](https://www.expensify.com/)
9. **CAM SCANNER *–*** Accessed May 12, 2016 *-* [*https://www.camscanner.com/*](https://www.camscanner.com/)
10. **Shoeboxed –** Accessed May 12, 2016[*https://www.shoeboxed.com/?utm\_source=google\_play\_store&utm\_medium=text&utm\_campaign=website*](https://www.shoeboxed.com/?utm_source=google_play_store&utm_medium=text&utm_campaign=website)

# Appendix

Table 2. Expensify

|  |  |
| --- | --- |
| **App** | Expensify |
| **Ease of installation** | Does ask for some special permissions, requires you to use a confirmation e-mail to complete process and set up account online. |
| **Automatic Optical Character Recognition** | Available. Takes a few minutes but actually works with accuracy far better than any other app I tested. |
| **Reports** | Allows you to create your own reports and start adding expenses to them. |
| **Data organization** | Has pre-defined categories for expenses. |
| **Additional Features** | You can select your currency, i.e. Canadian Dollars or others, there is a long list to choose from. |
| **Link** | [Expensify](https://play.google.com/store/apps/details?id=org.me.mobiexpensifyg&hl=en) (https://play.google.com/store/apps/details?id=org.me.mobiexpensifyg&hl=en) |
| **Groups** | Free version does allow you to invite others to share data with you, but it is not clear how data from others is organized or reported on. |
| **Comments** | Scanning process takes time, but works well, better than other apps. But, it only shows a total, not a breakdown with sales tax, etc. It is not clear from their web site whether it is using human verification like Shoeboxed or not. |

Table 3. CamScanner

|  |  |
| --- | --- |
| **App** | CamScanner |
| **Ease of installation** | Does require special permissions and setting up an account. Account setup requires Activation E-mail, then you enter activation code and app will request permissions. |
| **Automatic Optical Character Recognition** | Yes but does not work particularly well. |
| **Reports** | No but this is a general document scanner with O.C.R. rather than a specific receipt scanner. |
| **Data organization** | Can upload pdfs to Google Drive but not documents that have been scanned with O.C.R without upgrading and paying for premium version. |
| **Additional Features** | Fairly basic app, not a lot of extra features. |
| **Link** | [CamScanner](https://play.google.com/store/apps/details?id=com.intsig.camscanner&hl=en) (https://play.google.com/store/apps/details?id=com.intsig.camscanner&hl=en) |
| **Groups** | You can invite others to view and comment on your scans, but it is not clear that you can become the administrator of a group and manage groups in detail. |
| **Comments** | Logging in to online account does not work after set up of account on cell phone. |

Table 4. ShoeBoxed

|  |  |
| --- | --- |
| **App** | ShoeBoxed |
| **Ease of installation** | Asks for a LOT of permissions to access things on your phone, more than some people might be  comfortable with. AND requires you to have an account. |
| **Automatic Optical Character Recognition** | Yes, but the service puts it through human verification. |
| **Reports** | Can’t find report functions here. |
| **Data organization** | Can add note to a receipt but not put in categories. |
| **Additional Features** | Also includes trip tracker to record distances. |
| **Link** | [Shoeboxed](https://play.google.com/store/apps/details?id=com.shoeboxed.android.phonegapapp&hl=en)  (https://play.google.com/store/apps/details?id=com.shoeboxed.android.phonegapapp&hl=en) |
| **Groups** | N/A |
| **Comments** | Does not seem to have as many features and options as other apps. |

Table 5. Smart Receipts

|  |  |
| --- | --- |
| **App** | SmartReceipts |
| **Ease of installation** | Easy to install and start using on Android Phone. No special permissions, no need for an account. |
| **Automatic Optical Character Recognition** | No |
| **Reports** | You can generate PDFs, CSV files or a JPG. It was tested by creating a report in PDF format. It was easy to do this, although the expense report did not include the receipt name that was entered, just the category. |
| **Data organization** | Receipts can be put into pre-defined categories, including an “Other” category. But, no obvious way to add a new category. |
| **Additional Features** | Has an import/export function for making and loading from backups. |
| **Link** | [SmartReceipts](https://play.google.com/store/apps/details?id=wb.receipts&hl=en)(https://play.google.com/store/apps/details?id=wb.receipts&hl=en) |
| **Groups** | N/A, does not appear to be available in the free version |
| **Comments** | Has a long list of settings you can use, many options. |

Table 6. Receipts

|  |  |
| --- | --- |
| **App** | Receipts |
| **Ease of installation** | Easy to install and start using on Android Phone. No need for an account, but does require quite a few special permissions. |
| **Automatic Optical Character Recognition** | No |
| **Reports** | You can generate a nice variety of reports. |
| **Data organization** | Receipts can be put into pre-defined categories, and you can add new categories. |
| **Additional Features** | Although it does not employ O.C.R., you can take a photo of a receipt and save it as an attachment. |
| **Link** | [Receipts](https://play.google.com/store/apps/details?id=com.tidalpoolsoftware.receipts&hl=en)(https://play.google.com/store/apps/details?id=com.tidalpoolsoftware.receipts&hl=en) |
| **Groups** | Does not appear to allow groups involving other people, just grouping your own receipts. N/A |
| **Comments** | Has a long list of settings you can use, many options. |

Table 7. Google Drive

|  |  |
| --- | --- |
| **App** | Google Drive |
| **Ease of installation** | Already installed |
| **Automatic Optical Character Recognition** | Yes but does not work for receipts. When you upload a scan onto Google Drive, you can search for it based on key terms the O.C.R. found, but I tested this with a receipt and it did not work until I opened up the receipt as a Google Doc, and then the O.C.R. did not work well. |
| **Reports** | No, but this is not specifically a receipt tracker. |
| **Data organization** | Just loads the scan onto Google Drive. |
| **Additional Features** |  |
| **Link** | [Google Drive Blog](https://drive.googleblog.com/2013/05/a-smoother-drive-app-for-android.html) (https://drive.googleblog.com/2013/05/a-smoother-drive-app-for-android.html) |
| **Groups** | Can share documents with other people and could organize things based on desired groups but no easy way to specifically generate reports, etc. based on this data. |
| **Comments** | Tried this because it can be used to scan documents and is supposed to have O.C.R. |

Table 8. Comparison of BAAS (Backend As A Service)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **LoopBack** | **Express** | **Hapi** | **Sails** | **Restify** | **Meteor** |
| **Type** | API framework | HTTP server library | HTTP server framework | Web MVC framework | REST HTTP library | Full-stack JavaScript app platform |
| **Top Features** | Enterprise connectivity, API Explorer, generators, client SDKs, websocket microservices | HTTP routing, middleware | Modularity, security | Rails familiarity, MVC | Simplicity, REST routing | Universal JavaScript, reactive rendering, websocket microservices |
| **Suitable For** | Web apps, APIs | Simple web apps | Web apps, APIs | Web apps, APIs | Simple REST APIs | Web apps |
| **Github Stars** | 5k | 19k | 4k | 10k | 3k | 28k |
| **Support** | StrongLoop | StrongLoop | N/A | N/A | N/A | Meteor Development Group |
| **Pure Node runtime** | Yes | Yes | Yes | Yes | Yes | No |
| **Client SDKs** | Angular, Browser, Node.js, iOS, Android, Xamarin | N/A | None | None | None | JavaScript, Cordova for iOS and Android, React, AngularJS |
| **Export API Definition** | Yes | With strong-remoting | None | None | None | With meteor-rest |
| **Tools** | Visual API composer, Explorer, CLI code generators | CLI app generator | Yeoman generator | Yeoman generator | Yeoman generator | CLI tool |
| **Visual API composition** | Yes | No | No | No | No | No |
| **StrongLoop Arc Build & Deploy, Monitoring, Profiling** | Yes | Yes | Yes | Yes | Yes | Yes |
| **Extensions** | Push, File Storage, Passport, OAuth 2.0, Express Middleware | Express / Connect Middleware | Hapi Plugins |  |  | Proprietary package system and repository, npm |
| **Data sources** | In-memory/file, MongoDB, MySQL, Oracle, PostgreSQL, SQL Server, ATG, Email, REST, SOAP | None | None | In-memory, File, PostgreSQL, MySQL, MongoDB | None | MongoDB, MySQL and PostgreSQL via 3rd-party packages |
| **ACLs** | Yes | No | No | No | No | Basic allow/deny |